IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of	Atty. Docket
GUISEPPE PASQUALINI ET AL.	PHIT020018US
Serial No.: 10/521,131	Group Art Unit: 2628
Filed: January 12, 2005	Examiner: E. Martello
	Confirmation No.: 6805

NON-LINEAR PICTURE PROCESSING

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

APPEAL BRIEF

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(i) Real Party in Interest

The real party in interest in this application is KONINKLIJKE PHILIPS ELECTRONICS N.V. by virtue of an assignment from the inventors recorded on January 12, 2005, at Reel 016734, Frame 0108.

(ii) Related Appeals and Interferences

There are no other appeals and/or interferences related to this application.

(iii) Status of Claims

Claims 1-5 and 8-12 stand finally rejected by the Examiner; and claims 6, 7 and 13-20 have been cancelled. Appellants hereby appeal the final rejection of claims 1-5 and 8-12.

(iv) Status of Amendments

There was one Response filed on October 6, 2009, after final rejection of the claims on August 14, 2009, this Response having been considered and entered by the Examiner.

(v) <u>Summary Of Claimed Subject Matter</u>

The subject invention relates to picture signal processing and to adaptively improving the picture quality.

As claimed in claim 1, the subject invention includes: "A method of non-linear processing of at least one set of luminance, saturation, and hue parameter values of input picture signals so as to produce output picture signals based on the hue parameter value and an output luminance parameter value and an output saturation parameter value, wherein the method comprises the steps of:

receiving input picture signals ***(Figs. 1, 2: 14; page 4, line 1-2)***;

determining, using a matrix converter block, input luminance, saturation and hue parameter values of said input picture signals ***(Fig. 2: 22; page 4, lines 17-18)***;

obtaining the output saturation parameter value by increasing the input saturation parameter value up to a maximum level in a saturation processing block ***(Fig. 2: 24; page 5, lines 7-16)***; and

determining said maximum level using the input hue value and the output luminance parameter value in a saturation bound evaluation block such that clipping of a color driving value does not take place ***(Fig. 2: 34; page 5, line 30 to page 6, line 2)***."

As claimed in claim 2, in the method of claim 1: "the non-linear processing comprises the steps of:

determining a power depending on the hue parameter values ***(Fig. 2: 26; page 7, lines 18-28)***; and

raising the input saturation parameter value to the power ***(Fig. 2: 24; page 5, lines 8-16)***."

As claimed in claim 3, the method of claim 2 further comprises:

"adapting the power based on histogram data derived from one or more of the input parameter values ***(Fig. 2: 20, 18, 26; page 9, lines 13-20)***."

As claimed in claim 4, in the method of claim 1:

"the non-linear processing comprises the steps of:

determining a power depending on the hue parameter value ***(Fig. 2: 28; page 8, lines 15-18)***; and

raising the input luminance parameter value to the power ***(Fig. 2: 32; page 7, line 29 to page 8, line 1)***.

As claimed in claim 5, the method of claim 4 further includes:

"adapting the power based on histogram data derived from one or more of the input parameter values ***(Fig. 2: 20, 18, 28; page 9, lines 13-20)***."

As claimed in claim 8, in the method of claim 1:

"the maximum level depends on the output luminance parameter value ***(Fig. 2: 32, 34; page 5, line 30 to page 6, line 29)***."

As claimed in claim 9, in the method of claim 2:
"the output saturation parameter value is substantially determined by the equation:

$$S' = S_{max}(S/S_{max})^{\gamma_h} \quad ,$$

where S is the saturation parameter value, S_{max} is the maximum saturation value, and γ_h is the power ***(page 5, lines 7-13)***."

As claimed in claim 10, in the method of claim 3:
"for a predetermined hue parameter value, the power is adapted on the basis of a weighed average input saturation parameter value of the input picture signals, representing pixels in a window of an image ***(page 9, line 20 to page 10, line 3)***."

The subject invention further relates to an apparatus for non-linear processing of at least one set of luminance, saturation, and hue parameter values of input picture signals so as to produce output picture signals based on the hue parameter value and an output luminance parameter value and an output saturation parameter value. In particular, as claimed in claim 12, the apparatus includes:

"means for receiving input picture signals ***(Figs. 1, 2: 14; page 4, line 1-2)***;

means for determining input luminance, saturation and hue parameter values of said input picture signals ***(Fig. 2: 22; page 4, lines 17-18)***;

means for obtaining the output saturation parameter value by increasing the input saturation parameter value up to a maximum level ***(Fig. 2: 24; page 5, lines 7-16)***; and

means for determining said maximum level using the input hue value and the output luminance parameter value such that clipping of a color driving value does not take place ***(Fig. 2: 34; page 5, line 30 to page 6, line 2)***.

(vi) Grounds of Rejection to be Reviewed on Appeal

A. Whether the invention, as claimed in claims 1-5, 8 and 10-12, is unpatentable, under 35 U.S.C. 103(a), over U.S. Patent 5,436,673 to Bachmann et al. in view of U.S. Patent 4,731,662 to Udagawa et al.

B. Whether the invention, as claimed in claim 9, is unpatentable, under 35 U.S.C. 103(a), over Bachmann et al. in view of Udagawa et al., and further in view of U.S. Patent 5,742,296 to Yamada et al.

(vii) <u>Arguments</u>

35 U.S.C. 103(a) states:

> "(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made."

<u>A. Whether Claims 1-5, 8 and 10-12 Are Unpatentable Over Bachmann et al. in view of Udagawa et al.</u>

The Bachmann et al. patent discloses video signal color correction based on color hue.

The Udagawa et al. patent discloses an image processing method for processing an image signal differently depending on the range of an image characteristic thereof relative to the range within which an output device can reproduce the image characteristic.

<u>1. Claims 1 and 12</u>

The Examiner has indicated that while Bachmann et al. teaches "receiving input picture signals" and "determining input luminance, saturation and hue parameter values of said input picture signals", Bachmann et al. does not teach "obtaining the output saturation parameter value by increasing the input saturation parameter value up to a maximum level" and "determining said maximum level using the input hue value and the output luminance parameter value such that clipping of a color driving value does not take place". The

Examiner then states that Udagawa et al. teaches these limitations and notes col. 4, lines 22-68.

Appellants submit that the Examiner is mistaken. In particular, the noted section of Udagawa et al. states:

> "At step S11, a saturation histogram of an input color signal is formed by forming a distribution of pixels constituting an image frame for each hue signal H; in other words, the saturation distribution is checked with respect to each of a plurality of predetermined hues. Next, at step S12 the maximum saturation C(H)max and the minimum saturation C(H)min are detected for each hue signal H. At step S13, the difference between C(H)max and C(H)min and the maximum reproducing saturation C(H)L measured beforehand of the color printer for each hue signal H, are compared with each other. If C(H)max-C(H)min>C(H)L at step S13, then step S14 follows to perform a saturation compression process and obtain an output saturation C'(H) in accordance with the following formula.
>
> $$\frac{C(H)_L \cdot C(H)}{C(H)max - C(H)min} + C(H)min \rightarrow C'(H)$$
>
> "As above, the saturation compression process as shown in FIG. 6A is carried out. Thus, it is possible to conduct saturation compression without destroying chromaticity continuity.
>
> "If it is judged that at step S13 C(H)max-C(H)min•C(H)L and at step S16 C(H)L•C(H)max, it means that as shown in FIG. 6B the saturation range of the input image is fully within the reproducing saturation range of the printer. Therefore, C(H) is directly output as C'(H) at step S17 without performing a saturation conversion. Thus, it is possible to reproduce the input image characteristics without any change.
>
> "If it is judged that at step S13 C(H)max-C(H-)min•C(H)L and at step S16 C(H)L <C(H)max, it means that as shown in FIG. 6C the maximum saturation of the input image exceeds the maximum value of the reproducing saturation range. In this case wherein the saturation is shifted to a higher range, the distribution histogram as a whole is shifted at step S19 in accordance with the following formula.
>
> "C(H)-(C(H)max-C(H)L)•C'(H)

"With this process, it is possible to reproduce the saturation shift of the output image and give a natural, visual impression due to the unchanged absolute value of the saturation range."

Appellants first would like to point out that there is no mention in Udagawa et al. of the output luminance parameter value, let alone the claim limitation "determining said maximum level using the input hue value and the output luminance parameter value in a saturation bound evaluation block such that clipping of a color driving value does not take place". Further, while Udagawa et al. discloses determining the output saturation (C'(H)), there is no disclosure or suggestion of increasing the input saturation up to a maximum level. Rather, Udagawa et al. merely detects the input maximum saturation C(H)max and minimum saturation C(H)min for each hue signal (lines 27-30), determines the difference between these values, and compares the difference and C(H)max to a measured maximum reproducing saturation C(H)L of the color printer - if the difference is greater than C(H)L, then the a compression is performed to determine the output saturation C'(H) (Fig. 6A, line 40); if the difference and C(H)max is less than C(H)L then the saturation is left unchanged (Fig. 6B, line 51); and if the difference is less than C(H)L while C(H)max is greater than C(H)L, then the saturation is shifted (as per the formula at line 62, Fig. 6C). In summary, either the input saturation is left unchanged or the saturation is reduced.

Appellants therefore stress that nowhere is there any disclosure of **increasing** the input saturation to a maximum value, and further of determining the "maximum value using the input hue

value and the output luminance parameter value in a saturation bound evaluation block such that clipping of a color driving value does not take place".

The Examiner further states "In regard to output luminance parameter value, it should be noted that Udagawa passes the input luminance parameter value to the output color conversion matrix unchanged so that the output luminance equals the input luminance and is used in the color modifying methods and thus meets the limitations of claim 1. (See Udagawa figure 4)."

Appellants submit that while Udagawa et al. shows, in Fig. 4, that the input luminance parameter value passes unchanged from the encoder 111, through the CPU 113 to the masking circuit 116, there is no disclosure or suggestion that this luminance parameter value is used at all in the CPU 113 to determine the maximum level of the output saturation parameter value. Rather, Udagawa et al., as clearly shown in Fig. 5 and describes at col. 4, lines 22-68, determines the output saturation level based on the input hue, the input saturation level at each hue value, and the maximum allowable saturation level of the printer C(H)L. In contrast therewith, Appellants refer the Examiner to Fig. 2 of the subject application which shows the output luminance value Y' at the output of non-linear luminance processing block 32 being applied to the saturation bound evaluation block 34, as well as the specification on page 5, line 30 to page 7, line 16, where it is described in detail how the saturation bound evaluation block 34 uses the output

luminance parameter value Y’ to determine the maximum saturation value Smax.

2. Claim 4

Claim 4 includes the limitation “wherein the non-linear processing comprises the steps of:

determining a power depending on the hue parameter value; and

raising the input luminance parameter value to the power.”

The Examiner states “...Bachmann further teaches wherein the non-linear processing comprises the steps of: determining a power (any desired function; '673; col. 4, in. 29-33) depending on the hue parameter value; and raising the input luminance parameter value to the power (any desired function; '673; col. 4, In. 29-33) (Y*KORR.LUM, '673; fig. 1, functional block 18).”

Appellants submit that since claim 4 depends from claim 1, the limitations of claim 4 cannot be taken in a vacuum. In particular, the output luminance parameter value now specifically differs from the input luminance value by the raising of the input luminance parameter value to the determined power. This then affects the determining of the maximum saturation level Smax in the saturation bound evaluation block 34. However, there is no disclosure or suggestion in Bachmann et al. and Udagawa et al. that the maximum saturation level is determined based on the output luminance value, which now differs from the input luminance value.

B. Whether Claim 9 Is Unpatentable Over Bachmann et al., Udagawa et al. And Yamada et al.

The above arguments concerning Bachmann et al. and Udagawa et al. are incorporated herein.

The Yamada et al. patent discloses an image processing method and apparatus therefor.

Claim 9 includes the limitation "the output saturation parameter value is substantially determined by the equation:

$$S' = S_{max}(S/S_{max})^{\gamma_h}$$

where S is the saturation parameter value, Smax is the maximum saturation value, and is the power" where, according to claim 2, the power is determined based on the hue parameter value.

The Examiner has indicated:

> "Yamada, working in the same field of endeavor, however, teaches a method for the benefit of preventing over saturation of the S values in the corrected image, wherein a saturation-related output parameter value $S'(y_o)$ that is substantially determined by the equation: $S' = S_{max}*(s/S_{max})^{Yh}$ {$Y_o=Y_1(1-(1- Y_P\backslash Y_t)**Y_c\ Y_i$} ('296; col. 6, In. 63-67, col. 7, ln. 1-2) where all the gamma values (saturations) are normalized to the value of 1 so that the form of this equation becomes the form of the instant application. In addition, y_t corresponds to S, y_P corresponds to S_{max} and y_j is approximately equal to S_{max} ('296; col. 6, ln. 25-45)."

However, Appellants submit that Yamada et al. does not supply that which is missing from Bachmann et al. and Udagawa et al., i.e., "obtaining the output saturation parameter value by increasing the input saturation parameter value up to a maximum level" and "determining said maximum level using the input hue

value and the output luminance parameter value such that clipping of a color driving value does not take place”.

Based on the above arguments, Appellants believe that the subject invention is not rendered obvious by the prior art and is patentable thereover. Therefore, Appellants respectfully request that this Board reverse the decisions of the Examiner and allow this application to pass on to issue.

Respectfully submitted,

by ___/Edward W. Goodman/______
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(viii) Claims Appendix

1. A method of non-linear processing of at least one set of luminance, saturation, and hue parameter values of input picture signals so as to produce output picture signals based on the hue parameter value and an output luminance parameter value and an output saturation parameter value, wherein the method comprises the steps of:

receiving input picture signals;

determining, using a matrix converter block, input luminance, saturation and hue parameter values of said input picture signals;

obtaining the output saturation parameter value by increasing the input saturation parameter value up to a maximum level in a saturation processing block; and

determining said maximum level using the input hue value and the output luminance parameter value in a saturation bound evaluation block such that clipping of a color driving value does not take place.

2. The method as claimed in claim 1, wherein the non-linear processing comprises the steps of:

determining a power depending on the hue parameter values; and

raising the input saturation parameter value to the power.

3. The method as claimed in claim 2, wherein said method further comprises the step of:

adapting the power based on histogram data derived from one or more of the input parameter values.

4. The method as claimed in claim 1, wherein the non-linear processing comprises the steps of:

determining a power depending on the hue parameter value; and

raising the input luminance parameter value to the power.

5. The method as claimed in claim 4, wherein said method further comprises the step of:

adapting the power based on histogram data derived from one or more of the input parameter values.

8. The method as claimed in claim 1, wherein the maximum level depends on the output luminance parameter value.

9. The method as claimed in claim 2, wherein the output saturation parameter value is substantially determined by the equation:

$$S' = S_{max}(S/S_{max})^{\gamma_h} ,$$

where S is the saturation parameter value, S_{max} is the maximum saturation value, and γ_h is the power.

10. The method as claimed in claim 3, wherein, for a predetermined hue parameter value, the power is adapted on the basis of a weighed average input saturation parameter value of the input picture signals, representing pixels in a window of an image.

11. The method as claimed in claim 10, wherein, for a predetermined hue parameter value, the power for a current window is dependent on the histogram data of a current and/or a previous window.

12. An apparatus for non-linear processing of at least one set of luminance, saturation, and hue parameter values of input picture signals so as to produce output picture signals based on the hue parameter value and an output luminance parameter value and an output saturation parameter value, the apparatus comprising:

means for receiving input picture signals;

means for determining input luminance, saturation and hue parameter values of said input picture signals;

means for obtaining the output saturation parameter value by increasing the input saturation parameter value up to a maximum level; and

means for determining said maximum level using the input hue value and the output luminance parameter value such that clipping of a color driving value does not take place.

(ix) Evidence Appendix

There is no evidence which had been submitted under 37 C.F.R. 1.130, 1.131 or 1.132, or any other evidence entered by the Examiner and relied upon by Appellant in this Appeal.

(x) Related Proceedings Appendix

Since there were no proceedings identified in section (ii) herein, there are no decisions rendered by a court or the Board in any proceeding identified pursuant to paragraph (c)(1)(ii) of 37 C.F.R. 41.37.